

WHAT IS CLAIMED IS:

1. A portable hands-free adapter device for use with a cellular telephone, the device comprising:

a loudspeaker electrically coupleable to the output of a cellular telephone;

5 a microphone electrically coupleable to the input of a cellular telephone;

a housing containing the loudspeaker and microphone, the housing being approximately pocket-sized; and

means for reducing internal howling within the housing sufficiently to enable use of the device as a telephone speakerphone.

10 2. The device of claim 1, wherein the loudspeaker has sufficient output capacity so that a user positioned within a few feet of the device can hear words spoken to the user by the person and broadcast via the loudspeaker.

3. The device of claim 2, wherein the output capacity of the loudspeaker is about 60 decibels.

15 4. The device of claim 1, wherein the microphone has sufficient sensitivity to pick up speech of a user positioned within a few feet of the device when the user is speaking in a normal conversational volume.

5. The device of claim 4, the microphone has sufficient sensitivity to pick up speech at about 30 decibels.

20 6. The device of claim 1, wherein a volume of the housing is less than 6 cubic inches.

7. The device of claim 6, wherein the device is no more than about 3.5 inches in length, no more than about 2.2 inches in width, and no more than about 0.7 inches in thickness.

8. The device of claim 6, wherein a distance between the microphone and the loudspeaker in the housing is less than 100 millimeters.

9. The device of claim 8, wherein a distance between the microphone and the loudspeaker in the housing is less than 80 millimeters.

10. The device of claim 9, wherein the means for reducing internal howling comprises sound insulating material disposed within the housing between the loudspeaker and the microphone.

11. The device of claim 10, wherein the material is sponge which changes the phase of sound waves passing through the sponge.

12. The device of claim 10, wherein the sponge surrounds a back of the loudspeaker.

13. The device of claim 1, comprising attenuation circuitry for reducing howling by varying an amplification level of the signal provided to the microphone inversely with a power output of the loudspeaker.

14. The device of claim 1, wherein the microphone has an outlet for receiving sound, and wherein the loudspeaker has an outlet for emitting sound, and wherein the outlet of the microphone faces in substantially the same direction as a direction that the loudspeaker outlet faces.

15. The device of claim 14, wherein a line extending in the direction that the outlet of the loudspeaker faces is perpendicular to a line extending between the outlets of the loudspeaker and microphone.

16. The device of claim 1, comprising at least one conductive path between the microphone and loudspeaker.

17. The device of claim 1, comprising circuitry for receiving power from standard size batteries.

18. The device of claim 17, wherein the batteries are no larger than size AAA.

19. A portable hands-free adapter for use with a cellular telephone, the device
5 comprising:

a loudspeaker electrically coupleable to the output of a cellular telephone;

a microphone electrically coupleable to the input of a cellular telephone;

a housing containing the loudspeaker and microphone, the housing being
approximately pocket-sized;

10 attenuation circuitry coupled to the loudspeaker and microphone; and

sound insulation positioned between the loudspeaker and microphone,

wherein the attenuation circuitry and sound insulation reduce howling sufficiently
to enable use of the device as a speakerphone.

20. A portable speakerphone device adaptable for use with a cellular telephone, the
15 device comprising:

a loudspeaker electrically coupleable to the output of a cellular telephone and
having a loudspeaker outlet;

a microphone electrically coupleable to the input of a cellular telephone and
having a microphone outlet facing in a first direction;

20 a housing containing the loudspeaker and microphone, the housing being
approximately pocket-sized and forming a plane; and

means for insulating sound positioned within the housing between the
loudspeaker and microphone;

wherein the outlet of the loudspeaker faces in a first direction substantially normal to the plane of the housing and the outlet of the microphone faces in a second direction substantially normal to the plane of the housing.

21. The device of claim 20, wherein the first and second directions are substantially the same.

22. A portable speakerphone device adaptable for use with a cellular telephone, the device comprising:

a loudspeaker electrically coupleable to the output of a cellular telephone;

a microphone electrically coupleable to the input of a cellular telephone;

a housing containing the loudspeaker and microphone, the housing being approximately pocket-sized; and

means for insulating sound positioned within the housing between the loudspeaker and microphone;

23. A portable speakerphone device adaptable for use with a cellular telephone, the device comprising:

a loudspeaker electrically coupleable to the output of a cellular telephone and having a loudspeaker outlet;

a microphone electrically coupleable to the input of a cellular telephone and having a microphone outlet facing in a first direction; and

a housing containing the loudspeaker and microphone, the housing being approximately pocket-sized and forming a plane;

wherein the outlet of the loudspeaker faces in a first direction substantially normal to the plane of the housing and the outlet of the microphone faces in a second direction substantially normal to the plane of the housing.

24. A method for making a portable speakerphone device adaptable for use with a cellular telephone, the method comprising:
- providing pocket sized housing means defining an exterior of the device;
 - disposing loudspeaker means within the housing means;
 - disposing microphone means within the housing means;
 - providing means for reducing howling sufficiently to enable use of the device as a telephone speakerphone.

25. The method of claim 24, comprising providing a housing defining a volume of space less than 6 cubic inches.

26. The method of claim 25, comprising providing a housing no more than about 3.5 inches in length, no more than about 2.2 inches in width, and no more than about 0.7 inches in thickness

27. The method of claim 26, comprising positioning the microphone and the loudspeaker less than 100 millimeters apart.

28. The method of claim 27, comprising positioning the microphone and the loudspeaker less than 80 millimeters apart.

29. The method of claim 24, wherein providing means for reducing howling comprises disposing sound insulating material between the loudspeaker and the microphone.

30. The method of claim 29, wherein the material is sponge.

31. The method of claim 29, wherein disposing sound insulating material comprises surrounding a back of the loudspeaker with sponge.

32. The method of claim 24, comprising providing attenuation circuitry for varying an amplification level of a signal provided to the microphone inversely with a power output of the
5 loudspeaker.

33. The method of claim 24, comprising positioning the loudspeaker and microphone such that an outlet of the loudspeaker faces in a first direction substantially normal to a plane formed by the housing and an outlet of the microphone faces in a second direction substantially normal to the plane formed by the housing

10 34. the method of claim 33, wherein positioning the loudspeaker and microphone comprises positioning the loudspeaker and microphone such that the first and second directions are substantially the same.

35. A method for making a portable speakerphone device adaptable for use with a cellular telephone, the method comprising:

15 providing pocket sized housing means defining an exterior of the device;

disposing loudspeaker means within the housing means;

disposing microphone means within the housing means;

providing attenuation circuitry means; and

providing sound insulation means positioned between the loudspeaker means and

20 the microphone means, wherein the attenuation circuitry means and the insulation means reduce howling sufficiently to enable use of the device as a telephone speakerphone, and wherein the outlet of the loudspeaker faces in the same direction as the outlet of the microphone, and wherein a line extending between the outlet of the loudspeaker and the outlet of the microphone would

form a right angle with a line extending in the direction that the outlet of the loudspeaker and the outlet of the microphone face.

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